

**EFFECT OF PLANT GROWTH REGULATORS
ON CHEMICAL QUALITY CHARACTERISTICS
OF STORED SEEDS OF TWO COTTON
VARIETIES**

ABSTRACT

Cotton is grown purposely for its fiber, but products from cottonseed are also of economic importance. Cottonseed is currently the major source of edible oil and meal for livestock. Foliar applications of plant growth regulators are one of the approaches that have been employed to increase yield in cotton (*Gossypium hirsutum* L.). Data about the effectiveness on the application of these PGRs on cotton production is limited. Field study was carried out in 2016 at Sanguli in the Saboba District in Ghana on a sandy loamy soil using Stam-129 and FK-37 varieties to evaluate two commercial plant growth regulators, Mepiquat chloride and Paclobutrazol, each was sprayed with 250ml/ha at two different periods 60 and 80 days after sowing. The design used for the experimental was a randomized complete block design (RCBD) with treatments replicated three times. The results obtained indicated that seed protein and oil content increased significantly ($P<0.05$) by the application of MC and PBZ on both varieties. The mean oil content for both Stam-129 and FK-37 variety was 21.41% and 21.28% respectively. The average carbohydrate content for Stam-129 and FK-37 variety was 26.26% and 26.87% respectively. The mean crude protein content after 30 days of storage was 28.97% and 30.01% for Stam-129 and FK-37 variety respectively. The average oil content of 21.54% and 21.51% was recorded for the Stam-129 and FK-37 variety respectively, while the mean carbohydrate content for Stam-129 and FK-37 variety was 26.18% and 26.59% respectively. The mean crude protein content after 60 days of storage was 28.84% and 29.95% for Stam-129 and FK-37 variety. The average oil content recorded for Stam-129 and FK-37 variety was 21.76% and 22.02% respectively, also, the mean carbohydrate content of 26.25% and 26.50% was recorded for Stam-129 and FK-37 variety. Similar observations were made in the 90 days of storage. It was concluded that foliar application of MC and PBZ at a concentration of (250ml/ha) positively enhanced the yield of cotton, seed oil, seed index, protein and carbohydrate content. However, they were a reduction in the value of lint percentage. From the findings of this study, it seems rational to recommend that foliar application of PGRs (MC and PBZ), could seed oil and protein content as compared with the ordinary agronomic practices carried out by Ghanaian cotton farmers.

Keywords: *photosynthates, partitioning, varietal differences, oxidation-reduction, absorption and utilization*

1. INTRODUCTION

Cotton (*Gossypium hirsutum* L) is one of the most important commercial crops of the world valued for its oil, fiber and other by-products. Cottonseed oil finds usefulness in the production of biscuits, crackers, doughnuts and potato chips and the preparation of ice cream substitutes (mellorines), in which processed oil replaces butter fat. Cottonseed oil find it application in the industrial uses such as alkyl resins for interior paints, special lubricants and soft soaps [1]. Cottonseed

and cottonseed oil has varied implications. Cottonseed meal can be used as a dry organic fertilizer due to presence of about 49 g per 100 g protein and other nutrients [2]. Cottonseed oil is common for frying purposes, and is less costly as compared to olive oil or canola oil. Due to its flavor stability it is suitable for salad dressing and mayonnaise. Good quality oil extracted from cottonseed is used in lubricants, paints, bath soaps and moisturizing lotions [3]. The outer cover of cottonseed is a rich source of protein and cellulose, and also most cost effective animal feed. The oil has also been explored as a feedstock for biodiesel production.

Cotton is one of the most important source of foreign exchange earnings in over 15 countries in Sub-Saharan African (SSA) and a very important source of cash income for many of rural people in these countries. Cotton is therefore very critical in the fight against rural poverty. The World Bank and many development institutions have been assisting many cotton producing countries of SSA to improve their cotton sector performances through projects supporting investment, improve technology as well as policy and institutional reforms [4].

In Ghana, the production of cotton is in the three northern regions; Upper East, Upper West and Northern Regions. Since the evolution of cotton production in 1968, the production of cotton has rather been erratic and trend in volumes of cotton produce has never go beyond 40,000 tones. Yield levels have never exceeded 800kg/ha. There is a striking difference when Ghana is compared to her neighboring country Burkina Faso; Burkina Faso since 2004 produces more cotton each year than Ghana at a cumulated total production since 1968. Cotton production in Ghana amounts to less than 1% of the West and Central African production [5].

The low level of cotton production in Ghana is attributed to poor seed, low yields and fiber quality due to inadequate utilization of inputs; low level of mechanization hampering overall production; and no by-product utilization, leading to poor competitiveness of the sector [5]. This notwithstanding, Ghana has a land mark of 500,000 hectares of which over 80% lies in the Northern part of Ghana with a potential of producing 200,000 metric tons of lint cotton with market value exceeding US\$200 million. Crop management and soil fertility is identified as one of the most critical factors of modern agricultural activity. Research conducted in these areas is spearheaded by the need to scale up cotton production to increase more yields.

In spite of adopting the best agronomic practices and high yielding varieties, there have not been any substantial increase in the quality of seed cotton and yields. In recent years, several approaches have been used to break this seed cotton yield and quality plateau. The the application of plant growth regulators is peculiar example [6]. The application of plant growth regulators (PGRs) in cotton encompasses a broad category of compounds that inhibit, or promote otherwise modify plant physiological or morphological processes as well as to increase cotton yield, seed and lint quality. The benefit of these PGRs have been that it affords producers the easiness at which plant growth can be modified to suit prevailing growing environment in order to increase yield benefits [6]. Mepiquat chloride (MC) and Paclobutrazol (PBZ) are plant growth regulators widely used in inhibiting gibberellic acid formation and plant height and thereby increases cotton yield and its quality [7] [8].

The objective was to determine the effect of Paclobutrazol (PBZ) and Mepiquat chloride (MC) on the chemicals properties of the cotton seed.

2. MATERIALS AND METHODS

2.1 EXPERIMENTAL SITE

Field trials were carried out in a sandy loamy soil in the 2016 cotton growing season at Sanguli in the Saboba District of Northern Region of Ghana, with a geographical coordinate of 9°43'3" North, 0°19'20" East. The area lies within the savannah climatic belt with single maximum rainfall, average annual rainfall is between 1000mm and 1400mm. the rains occur between May and October.

2.2 EXPERIMENTAL DESIGN AND MATERIALS

The study was laid out in Randomized Complete Block Design with six (6) treatments and three (3) replication. Two varieties of a delinted cottonseed namely Stam -129 and FK-37 were obtained from Wience Cotton Ghana Limited.). Each plot sizes were 4 m wide and 4 m in long, with an inter row spacing of 0.7 m and intra row spacing of 0.35 m. A 2 m border spacing was left between blocks to reduce edge effects. The cotton was planted on the 26th June, 2016. Hand thinning was carried out at the stage where the seedlings had 3 to 5 leaves leaving a stand of 2 plants per hill. The normal practices for controlling farm insect was carried out in all the treatment. The treatments consisted of the two cultivars

(STAM-129 and FK-37) having two commercial PGRs, namely 1, 1-dimethylpiperidinium chloride (Mepiquat chloride, pix or croft), Austar (Paclobutrazol) and control. A summary of all treatment, rate and date of application as shown in table 1.

Foliar application of treatments with 250 g active ingredient/liter was carried out with a uniform coverage in a solution of 160 liters of water per hectare for the Croft (Mepiquat chloride) and 160 liters of water per hectare for the Austar (Paclobutrazol) on 60 and 80 days after planting at equal doses using the 16 liter knapsack (Matabi) hand-held sprayer with two conical nozzles equipped with pressure regulator. The hole in each nozzle was 1.2 mm with a conical opening. Water was used as a control treatment. Application of the chemicals was done in the early hours of the day between 6 am and 7am when the wind is relatively calm to minimize drift. The chemical solution was prepared enough to treat all replications and an additional quantity to ensure optimum and proper function of the sprayer. To ensure uniform application of the treatment a constant walking was maintained throughout the spraying. After spraying all replications, the sprayer and nozzles were rinsed before beginning the next treatment. Insects/pests were kept below threshold level during crop season, by applying appropriate multiple applications of insecticides to all treatment depending on the type of insects/pests. Any other cultural/agronomic practices such as fertilization and weed control were kept uniform and constant for all treatments.

2.2 Data Collection

Laboratory tests were conducted at the University for Development Studies Spanish Lab for 300-g random samples of seeds per plot. Seed samples of the three replicates per treatment were used for chemical analysis. The following chemical analyses were conducted: (i) seed crude protein content according to AOAC, 1990 [9] (ii) seed crude fiber (iii) seed oil content (iv) seed carbohydrate (v) seed ash content (vi) seed moisture content.

Table 1. Summary of treatment, rate and date of application

Treatments	Rate of application	Date of application
T1:Stam-129 and Control	0	24/08/2016 and 13/09/2016
T2:Stam-129 plus Mepiquat chloride	250	24/08/2016 and 13/09/2016
T3: Stam-129 plus Paclobutrazol	250	24/08/2016 and 13/09/2016
T4: FK-37 plus and Control	0	24/08/2016 and 13/09/2016
T5:FK-37 plus Mepiquat chloride	250	24/08/2016 and 13/09/2016
T6:FK-37 plus Paclobutrazol	250	24/08/2016 and 13/09/2016

2.3 DATA ANALYSIS

The data obtained was subjected to analysis of variance (ANOVA) using Statistix Software version 10.0. Tukey's HSD (Honest Significant Difference) was used to compare the differences in treatment means at 5 percent probability ($P\leq0.05$).

3. RESULTS

3.1 Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed before storage

As shown in Table 2, the ANOVA for the six treatments and variety interaction before crude protein (30.03%) and that of the Stam -129 variety recorded the least (29.06%). The mean oil content for both Stam-129 and FK-37 variety was 21.41% and 21.28% respectively. The average carbohydrate content for Stam -129 and FK-37 variety was 26.26% and 26.87% respectively. However, there was no significant difference ($P\geq0.05$) between treatments and variety interaction for crude fiber, ash and moisture content. The mean crude fiber content was 19.69% and 20.67% for Stam-129 and FK-37 variety. The mean ash content for the FK-37 variety was the highest (6.77%) and that of the Stam-129 variety recorded

the lowest of 5.3%. The mean moisture content of 5.91% and 5.89% was recorded for the Stam-129 and FK-37 variety respectively (Table 2).

							106
							107
PGR	Crude Protein(%)	Crude Fiber(%)	Oil(%)	Ash(%)	Moisture(%)	CHO(%) ¹⁰⁸	108
							109
Stam-129							110
Control	28.54 b	19.66 a	20.76 c	5.27 a	5.91 a	24.96 b ¹¹¹	111
MC	29.40 a	19.72 a	21.78 a	5.33 a	5.91 a	27.10 a ¹¹²	112
PBZ	29.24 a	19.68 a	21.68 b	5.29 a	5.89 a	26.70 a ¹¹³	113
Means	29.06	19.69	21.41	5.30	5.91	26.26	114
SMD	0.38	0.59	0.09	0.09	0.06	0.94	115
CV	0.52	1.19	0.17	0.71	0.46	1.43	116
P	0.0008	0.943	0.0001	0.2212	0.7947	0.0008	117
FK-37 Variety							119
Control	29.51 b	20.65 a	20.54 b	6.72 a	5.90 a	25.51 b ¹²¹	121
MC	30.32 a	20.76 a	21.78 a	6.88 a	5.89 a	27.73 a ¹²²	122
PBZ	30.26 a	20.59 a	21.52 ab	6.71 a	5.89 a	27.38 a ¹²³	123
Means	30.03	20.67	21.28	6.77	5.89	26.87	124
SMD	0.24	0.18	1.03	0.25	0.09	0.57	125
CV	0.32	0.36	1.93	1.44	0.57	0.84	126
P	0.0001	0.0848	0.0221	0.1274	0.935	<.0001	127

Table 2. Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed before storage

*Means followed by the same letter in rows do not differ statistically between themselves

3.2 Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed after 30 days of storage

The Tukey test for the six treatments and variety interaction after 30 days of storage showed significant difference for crude protein, oil, and carbohydrate ($P \leq 0.05$) as shown in Table 3. The mean crude protein content after 30 days of storage was 28.97% and 30.01% for Stam-129 and FK-37 variety respectively. The average oil content of 21.54% and 21.51% was recorded for the Stam-129 and FK-37 variety respectively, while the mean carbohydrate content for Stam-129 and FK-37 variety was 26.18% and 26.59% respectively. However, there was no significant difference ($P \leq 0.05$) between treatments and variety interaction for ash, crude fiber and moisture content. The mean crude fiber content for the Stam-129 and FK-37 variety was 19.48% and 20.54% respectively. The average ash content of 5.28% and 6.59% was

recorded for the Stam-129 and FK-37 variety. The mean moisture content recorded for the Stam-129 and FK-37 variety after 30 days of storage was 5.22% and 5.15% respectively. Table 3 shows the effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment × variety interaction on proximate composition of cottonseed after 30 days of storage.

Table 3. Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed after 30 days of storage

PGR	Crude Protein(%)	Crude Fiber(%)	Oil(%)	Ash(%)	Moisture(%)	CHO(%)
Stam-129						
Control	28.59 b	19.41 a	20.94 c	5.26 a	5.21 a	24.90 b
MC	29.18 a	19.48 a	21.93 a	5.30 a	5.19 a	26.94 a
PBZ	29.14 a	19.54 a	21.76b	5.28 a	5.25a	26.69 a
Means	28.97	19.48	21.54	5.28	5.22	26.18
SMD	0.24	0.36	0.15	0.06	0.21	1.07
CV	0.33	0.73	0.27	0.48	1.64	1.64
P	0.0003	0.5323	<.0001	0.1935	0.7254	0.0021
FK-37 Variety						
Control	29.70 b	20.61 a	21.08 b	6.55 a	5.12 a	25.42 b
MC	30.22 a	20.59 a	21.81 a	6.61 a	5.18 a	27.32 a
PBZ	30.19 a	20.43 a	21.67 a	6.62 a	5.15 a	27.02 a
Means	30.04	20.54	21.51	6.59	5.15	26.59
SMD	0.14	0.27	0.30	0.37	0.21	0.82
CV	0.18	0.52	0.56	2.23	1.60	1.23
P	0.0001	0.157	0.0006	0.845	0.6876	0.0007

*Means followed by the same letter in rows do not differ statistically between themselves

3.3 Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed after 60 days of storage

The Tukey test carried out for the six treatments and variety interaction after 60 days of storage showed significant difference for crude protein, oil and carbohydrate ($P \leq 0.05$) as illustrated in Table 4. The mean crude protein content after 60 days of storage was 28.84% and 29.95% for Stam-129 and FK-37 variety. The average oil content recorded for Stam-129 and FK-37 variety was 21.76% and 22.02% respectively, also, the mean carbohydrate content of 26.25% and 26.50% was recorded for Stam-129 and FK-37 variety. However, there was no significant difference ($P \leq 0.05$) between treatments and variety interaction except for crude fiber, ash and moisture content (Table 4). The mean crude fiber content recorded for the Stam-129 and FK-37 variety was 19.61% and 20.23% respectively. The mean ash content of 5.27% and 6.55% was recorded for Stam-129 and FK-37 variety. The Stam-129 and FK-37 variety recorded a mean moisture content of 4.99% and 4.85% respectively after 60 days of storage (Table 4).

Table 4. Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed after 60 days of storage

PGR	Crude Protein(%)	Crude Fiber(%)	Oil(%)	Ash(%)	Moisture(%)	CHO(%)
Stam-129						
Control	28.35 b	19.44 a	21.19 b	5.24 b	5.03 a	24.85 b
MC	29.12 a	19.44 a	22.05 a	5.29 a	4.92 a	26.92 a
PBZ	29.04 a	19.95 a	22.03 a	5.29 a	5.01 a	26.99 a
Means	28.84	19.61	21.76	5.27	4.99	26.25
SMD	0.21	0.74	0.15	0.04	0.32	0.72
CV	0.29	1.50	0.27	0.33	2.52	1.09
P	<.0001	0.1228	<.0001	0.0231	0.5295	<.0001
FK-37 Variety						
Control	29.58 b	20.18 a	21.75 b	6.55 a	4.86 a	25.40 b
MC	30.16 a	20.30 a	22.27a	6.51a	4.95 a	27.41 a
PBZ	30.12 a	20.20 a	22.05 ab	6.60 a	4.72 a	26.94 a
Means	29.95	20.23	22.02	6.55	4.85	26.58
SMD	0.18	0.20	0.31	0.22	0.57	0.67
CV	0.24	0.40	0.56	1.32	4.68	1.01
P	<.0001	0.2284	0.0065	0.4616	0.4894	0.0001

*Means followed by the same letter in rows do not differ statistically between themselves

3.4 Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed after 90 days of storage

The Tukey test carried out for the six treatments and variety interaction after 90 days of storage showed significant difference for the crude protein, oil, ash moisture and carbohydrate ($P \leq 0.05$) for the Stam -129 variety as presented in Table 5. The average crude protein content of 28.87% and 29.97% was recorded for Stam-129 and FK-37 variety. The mean oil content for the Stam-129 and FK-37 variety was 21.78% and 22.13% respectively. The average ash content of 5.26% and 6.56% was recorded for Stam-129 and FK-37 varieties. The mean carbohydrate content recorded for the Stam-129 and FK-37 variety was 26.16% and 26.45% respectively. However, there was no significant difference ($P \leq 0.05$) between treatment on crude fiber, ash and moisture content. There was a significant difference between treatment on crude protein, oil and carbohydrate for the FK-37 variety. However, there was no significant difference between treatment on crude fiber, moisture and ash. The mean crude fiber content recorded for Stam-129 and FK-37 variety after 90 days of storage was 19.52% and 20.23% respectively. Also, an average moisture content of 4.78% and 4.55% was recorded for the Stam-129 and FK-37 variety (Table 5).

Table 5. Effect of plant growth regulators (Mepiquat Chloride MC, Paclobutrazol PBZ) treatment on proximate composition of cottonseed after 90 days of storage

PGR	Crude Protein(%)	Crude Fiber(%)	Oil(%)	Ash(%)	Moisture(%)	CHO(%)
Stam-129						
Control	28.36 b	19.44 a	21.31 b	5.22 b	4.83 a	24.90b
MC	29.19 a	19.44 a	22.01 a	5.29 a	4.87 a	26.83 a
PBZ	29.05 a	19.67 a	22.01 a	5.27 ab	4.65 a	26.75 a
Means	28.87	19.52	21.78	5.26	4.78	26.16
SMD	0.33	0.71	0.24	0.05	0.23	0.95
CV	0.46	1.45	0.44	0.40	1.95	1.44
P	0.0004	0.5459	<.0001	0.0156	0.0575	0.0011
FK-37 Variety						
Control	29.56 b	20.18a	21.77 b	6.61 a	4.45 a	25.33 b
MC	30.18 a	20.30 a	22.42 a	6.49 a	4.70 a	27.39 a
PBZ	30.16 ab	20.22 a	22.19 ab	6.57 a	4.49 a	26.64a
Means	29.97	20.23	22.13	6.56	4.55	26.45

SMD	0.62	0.21	0.65	0.18	0.38	0.92
CV	0.82	0.41	1.16	1.11	3.34	1.39
P	0.0349	0.2654	0.052	0.2058	0.1751	0.0013

*Means followed by the same letter in rows do not differ statistically between themselves

4.0 DISCUSSION

Foliar application of PBZ and MC had a significant effect on the seed protein as compare to the untreated control in both varieties. MC application recorded the highest crude protein content, followed by PBZ. This increase in the crude protein content of the seed may be the role that application of MC and PBZ plays in the synthesis of protein, facilitating the conversion of amino acids into protein. These results are in agreement to those conducted by [10] and [11]. They reported that foliar application of MC and PBZ increase the crude protein content of the seed by 25% and 35% respectively. [12] studies in safflower indicate that MC and PBZ maintained the level of chlorophyll, protein, and RNA contents. They concluded that the crude protein content increase may be attributed to the role of Pix in protein synthesis, encouraging the conversion of amino acids into protein. [13] stated that application of MC resulted in increased cottonseed protein content. [14] reported an increase in crude protein content of the seed when MC was applied at a rate of 40, 60, or 80 ppm at 60 days after sowing. [15] also reported an increase in the crude protein content of the seed when PBZ was applied. The different period of storage did not have any significant effect on the seed protein content. The FK-37 cultivar had the highest crude protein content over the Stam-129 cultivar. The results of the current study may be attributed to varietal differences since both variety were grown in the same environment and location. Their high protein content of the seed makes it appropriate source amino acids and protein for both human and animal.

MC and PBZ application resulted in an insignificant increase in the crude fiber content over the untreated control in both varieties. Application of MC recorded the highest crude fiber content, followed by PBZ. The storage duration did have a significant effect on the crude fiber content. The percentage of crude fiber was found to be in great variation with the commercial value of (18.49%) [16]. Our results showed that, the FK-37 cultivar had the highest crude fiber content over the Stam-129 cultivar. These results may be attributed to varietal differences since both variety were grown in the same environment and location. The crude fiber content of the seed in both variety was high when, from the result, crude fiber has enough fiber for dietary nutrition which will help to maintain intestinal distention, colon diseases, reduce constipation and cancer [17].

MC and PBZ application significantly increased the seed oil as compare to the untreated control in both varieties. Highest seed oil content was produced by MC application, followed by PBZ. The increase in the oil content of the seed may be the role that MC and PBZ play in increasing the lipids and the translocated assimilates to sink. This results are similar to the findings made by [18] in rape, that application of MC stimulates the accumulation of oil in the seed. According to [19], cottonseed oil yield is influenced by the environment factors and strongly controlled by multiple genes and other cultural practices carried out within the growing period. There was a gradual increased in the seed oil content over the different period of storage (Tables 2, 3, 4 and 5). The increases may be attributed to the role the moisture level of the seed plays, as the moisture content of the seed decline over the storage period, resulted in a correspondent increased in the seed oil content within the same period. From the study, it is revealed that cottonseed is very rich source of oil and very important in the human diet as it promote the absorption of soluble vitamin, fat promote high efficient energy. The potential of cottonseed oil is quite promising and has the potential to be used in commercial quantities for pharmaceutical, cooking, industries and other purposes.

Mepiquat chloride and Paclobutrazol application brought about in insignificant increase in the ash content to that of untreated control in both varieties. The application of MC recorded the highest ash content at the initial period followed by PBZ. The ash content decline along the storage period with the application of PBZ recording high values from 30 days of storage till the end of the 90 days' storage duration. From the results, the FK-37 cultivar had the highest ash content over the Stam-129 cultivar. These observations may be attributed to varietal differences since both variety were grown in the same period and location. The percentage of ash recorded in this study, shows enough inorganic matter that may be retained by the body.

MC and PBZ application have no significant effects in the moisture content over the untreated control in both varieties. From the results, the Stam-129 cultivar had the highest ash content over the FK-37 cultivar. These results may be attributed to varietal differences since both variety were grown in the same period and location. The moisture content found in all the two varieties is quite low in comparison with commercial standard which is 9.18% [16]. [20] found that moisture content of cottonseeds is a quite on the low in comparison with legumes which range between 7.0-11.0%. This means that cottonseed is very high in dry matter content which is beneficial in preventing oxidation-reduction reaction, reduces the microbial activities, algae and fungi growth and increase the shelf life of the cottonseed when stored properly.

Application of MC and PBZ significantly increased the carbohydrate content of the cottonseed as compared with the untreated control. Our results agree with [21], who reported that cotton plant treated with MC have bolls which have a larger photo synthetically sink for carbohydrates and other metabolites than those on untreated plants. Application of MC recorded the highest carbohydrate content, followed by PBZ. The storage duration did not have any significant effect on the carbohydrate content of the cottonseed. According to the results, the FK-37 cultivar recorded the highest carbohydrate content over the Stam-129 cultivar. These results may be attributed to varietal differences since both variety were grown in the same period and environment. The high calculated carbohydrate content of the cottonseed has energy which is sufficient for the utilization of the body.

5.0 CONCLUSION

It was concluded that foliar application of MC and PBZ at a concentration of (250ml/ha) positively enhanced seed oil, seed index, protein and carbohydrate content. The mean oil content for both Stam-129 and FK-37 variety was 21.41% and 21.28% respectively. The average carbohydrate content for Stam -129 and FK-37 variety was 26.26% and 26.87% respectively. The mean crude protein content after 30 days of storage was 28.97% and 30.01% for Stam-129 and FK-37 variety respectively. The average oil content of 21.54% and 21.51% was recorded for the Stam-129 and FK-37 variety respectively, while the mean carbohydrate content for Stam-129 and FK-37 variety was 26.18% and 26.59% respectively. The mean crude protein content after 60 days of storage was 28.84% and 29.95% for Stam-129 and FK-37 variety. The average oil content recorded for Stam-129 and FK-37 variety was 21.76% and 22.02% respectively, also, the mean carbohydrate content of 26.25% and 26.50% was recorded for Stam-129 and FK-37 variety. The increase in the yield of cotton and subsequent increase in protein and oil content as a result of MC and PBZ application would be sufficient to take care the cost of applying these chemicals and also result in economical profit in comparison with the usual cultural practices adopted by Ghanaian cotton procedures.

COMPETING INTERESTS

"Authors have declared that no competing interests exist."

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